

# Aeronautical Enterprise Program Office

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**U.S. AIR FORCE**

## **Aging Aircraft Wiring Integrity Program (AF WIP)**

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ASC/AAA***

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# Outline



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- **Background and Approach**
- **AF WIP Program Overview**
- **AFRL Programs**
- **ASC/AAA Programs**
- **Integrated Program Schedule**



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## ***Background and Approach***



# ***Problem Background***



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- **Civil and Military, As a Community, Have Been Addressing the Issue of Wire Integrity Prior to and Especially Since TWA 800**
- **Military Aircraft Wiring Integrity Has Become a Visible Aging Aircraft Issue**
  - Wiring issues may account for a significant amount of the total electrical maintenance costs
  - Wiring may need to be addressed as a “System”
- **Current AF Approach Is Reactive Not Proactive**
- **Impact of Wire Related Maintenance Actions Is Not Documented**
  - Cost/Time
  - Mission Capability Rates



# ***Air Force Approach to Wire Integrity***



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- **Formation of Coordinated Wire Integrity Program**
  - Multi-Disciplined / Multi-Organizational Initiative
  - Multiple Contracts Spanning 2 years
- **Programs Focus On Various Aspects Of Wire Integrity**
  - Equipment Testing and Evaluation
  - Data Collection and Analysis
  - Advanced Technology Capability
- **Primary Program Goals Focus On . . .**
  - Providing maintainers with improved diagnostic equipment / capabilities to detect and repair wire related anomalies.
  - Providing the Air Force with a solid business case for implementing these capabilities.



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# ***AF WIP Program Overview***



# ***AF WIP Objectives***



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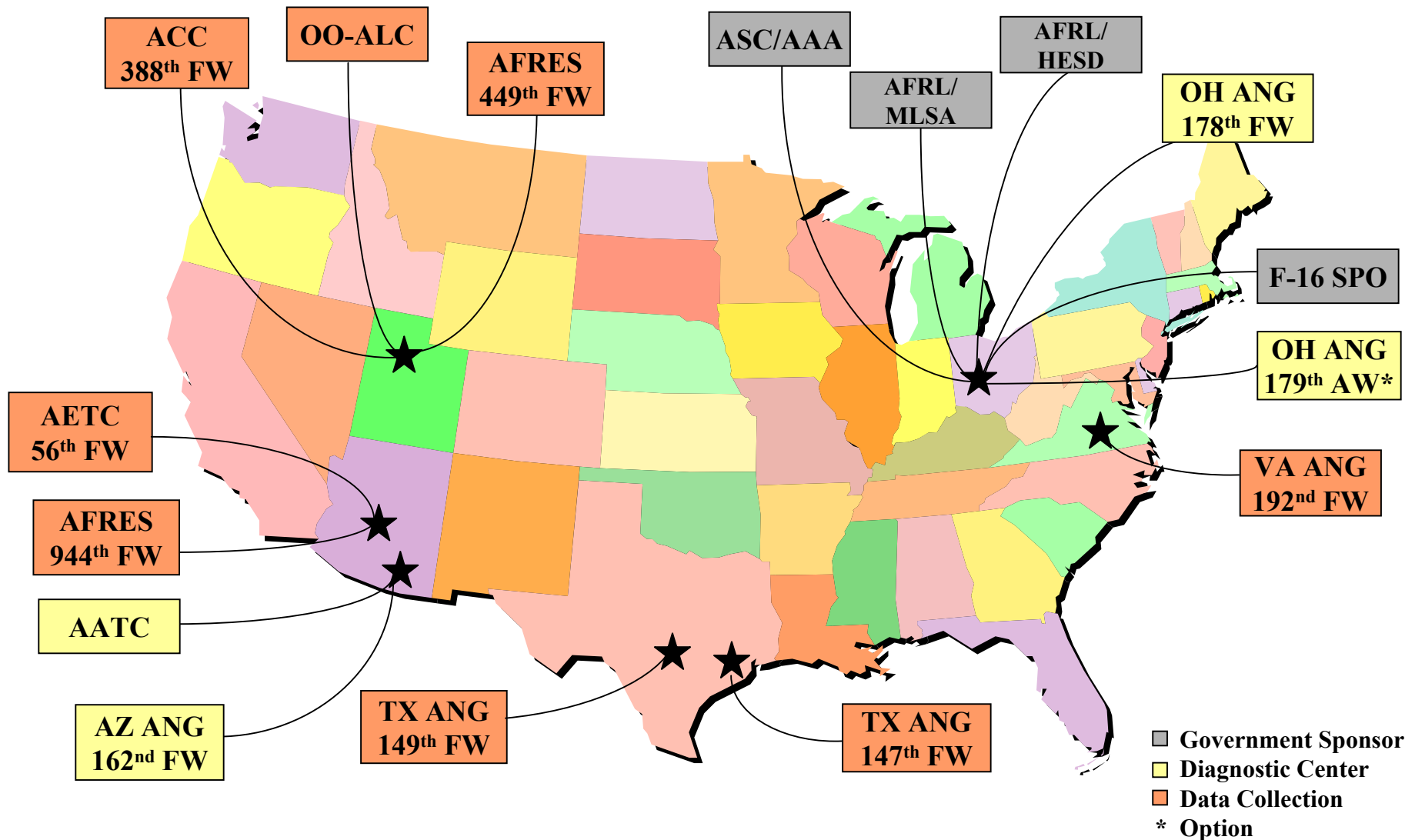
- **Evaluate a Commercial-Off-the-Shelf (COTS) Wire Testing Concept**
  - Will it reduce maintenance costs?
  - Will it Improve mission capability rates?
- **Document the Impact of a Proactive Wire Test Program**
- **Evaluate Emerging Wire Test Technologies**
  - Are they suitable for use in flight line maintenance?
  - Are they suitable for use in depot maintenance?
- **Recommend a Course of Action to Transition the COTS Wire Testing System to All AF Operational Units**



# AF WIP – Organizational Involvement



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# AF WIP Contract Initiatives



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- **ASC Phase I, II & III**
  - AF WIP Strategic Plan – *Completed*
  - AF WIP Implementation Plan – *Completed*
  - Establish and Operate Diagnostic Centers
- **AFRL - Improvement of Wire System Integrity for Legacy Aircraft Phase I & II**
  - Develop test-bed for evaluation of wire diagnostic system
  - Develop wire integrity system performance specifications
  - Evaluate and optimize wire system integrity test system(s) for field evaluation
- **AFRL - Wiring Integrity System Characterization and Evaluation Program**
  - Improve wiring system integrity by transitioning new materials and components
- **AFRL Dual Use Science & Technology (DUS&T)**
  - Commercial Airline Field Demonstration of Two Different Wire Integrity Testing Systems



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# ***AFRL Programs***



# ***AFRL DUS&T Program***



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- **Commercial Field Evaluation of Portable Wire System Testers**
  - America West
  - Airborne Express
- **Testing Includes Four C-WITS Products**
  - Honeywell (2), Eclipse (1), & Electrotect (1)
  - All systems previously tested and verified in lab evaluation
  - Evaluate baseline system plus one competing system
- **Field Evaluation to Verify Key Performance Parameters**
  - Fault Location
  - Anomaly Detection
  - Repair Verification
  - Other Factors (e.g., weight)
- **Program Will Provide Feedback For Military Field Evaluation**



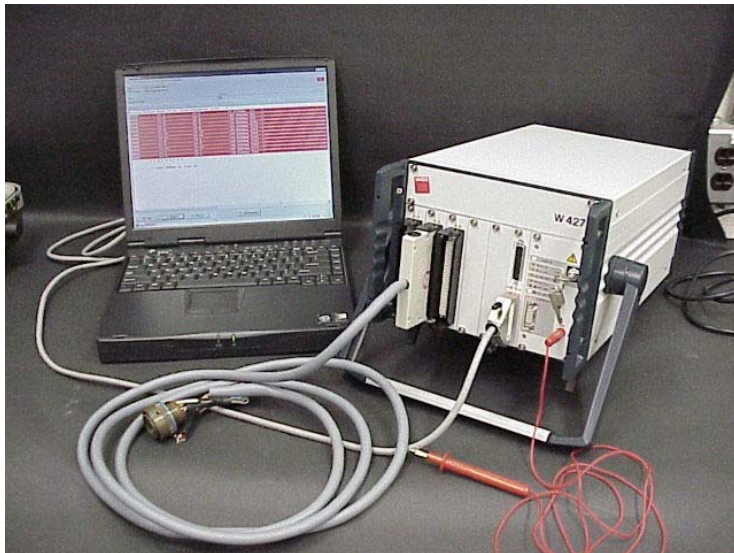
# DUS&T Equipment



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## Honeywell

- 2135 Circuit Analyzer
- FLD1000 TDR



## Schaffner EMC Electrotest

- WEE 427(Circuit Analyzer)

## Eclipse

- ESP (SWR)





# AFRL Characterization and Evaluation DO9



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## Typical Wiring Anomalies



Electrical



Chemical



Mechanical



Thermal

## AFRL Research Efforts

Lab Support  
And Evaluation

Material Research

Emerging Diagnostic  
Technology

Repair Technology

Process Characterization



# AFRL Phase I & II Lab Evaluation DO6



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## Stage I Validation Test

Verify Supplier  
Performance Claims

## Stage II A Functional Test

Opens  
Shorts  
Distance to Fault

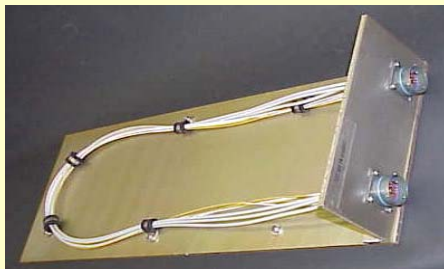
## Stage II B Functional Test

Corroded Connector  
Damaged Conductor  
Soft Faults  
Damaged Insulation

## Long Test Bed



## Short Test Bed



2 Test Beds  
6 Test Patches  
7 Wire Types

Provide Information  
To ASC Phase III to . . .

- Downselect for Field Evaluation
- Submit AF Form 1067



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## ***ASC/AAA Programs***

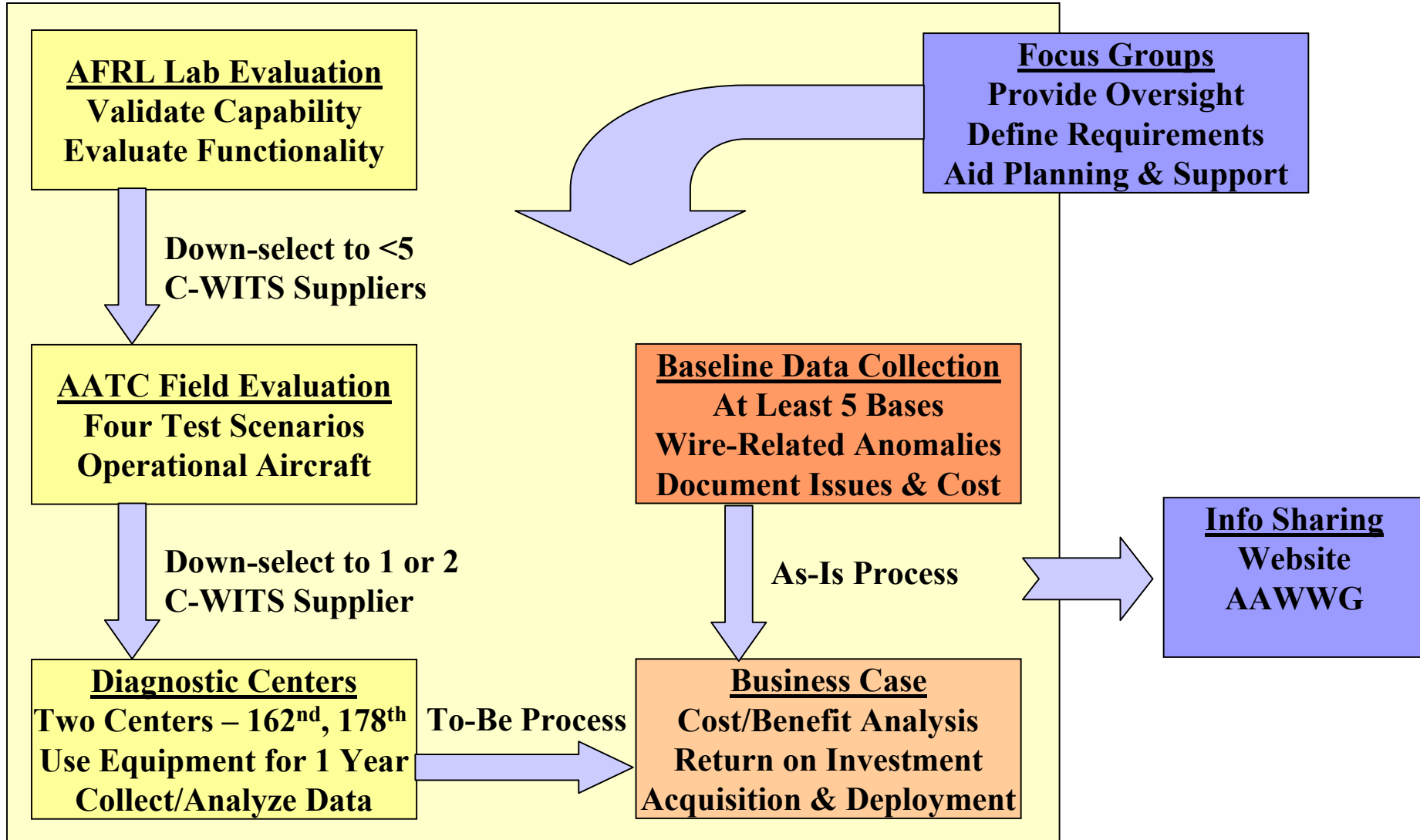




# AF WIP Phase III Program Overview



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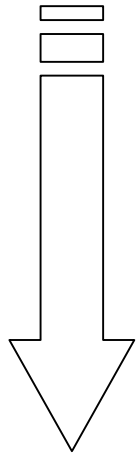
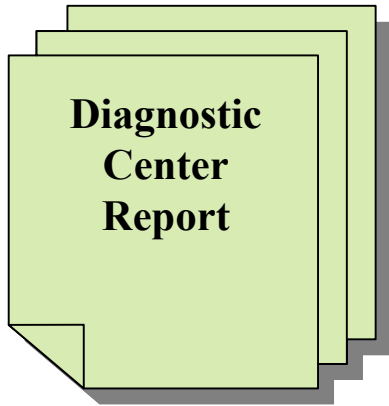




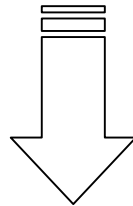
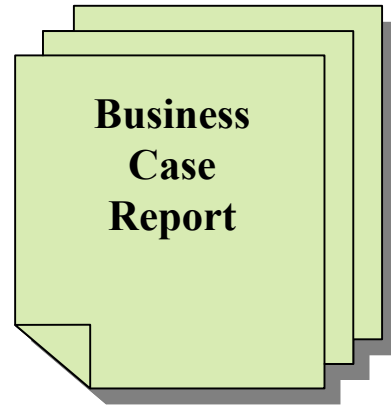
# Phase III Key Program Deliverables



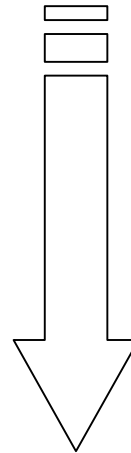
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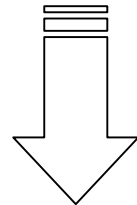
- **Lessons Learned**
- **Test Plans**
- **Training Materials**



- **Cost Benefit Analysis**
- **Return on Investment**



- **Logistics Support Plan**
- **Equipment Specifications**
- **Acquisition Strategy and Planning Documents**



- **Hardware/Software**
- **Operating Manual**
- **Training Material**



# Air Force Wire Integrity Website



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- **Goals**

- Improve documentation and dissemination of AF wiring-related data
- Improve collaboration with other government and industry forums
- Provide capability for WIP Team communication and collaboration

- **Location**

- [www.afwireintegrity.com](http://www.afwireintegrity.com)
- Includes both public and private pages
- Contact [mfherndon@att.com](mailto:mfherndon@att.com) to obtain a user ID

- **Contents**

- Calendar
- Library
- Points of Contact
- Data Analysis and Results
- AAWWG Conference Data
- Other WIP-Related Information



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# ***Integrated Program Schedule***



# AF WIP Integrated Schedule



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